CLAIM AMENDMENTS

1   1. (currently amended) A diode-pumped laser apparatus for

2   generating a visible power beam, the laser apparatus comprising:

3   a linear laser cavity having crystals and a length that

4   does not exceed the sum of ten times the sum of the lengths of the

5   crystals;

6   a plurality of reflectors that are highly reflective at a

7   fundamental wavelength of a laser beam generated by the laser

8   cavity, at least one of said reflectors being traversed by a pumping

9   beam, and reflecting at said fundamental wavelength and a second

10   harmonic wavelength with respect to said fundamental wavelength, and

11   being highly transmissive at said second harmonic of said

12   fundamental wavelength;

13   an active material with linear polarized emission and with

14   a gain configuration with small thermal aberration for cavity mode,

15   said active material being able to generate said laser beam at the

16   fundamental wavelength;

17   a nonlinear crystal inside said cavity and able to

18   generate a second harmonic of said fundamental wavelength by

19   critical type I phase matching; and

20   thermostating means associated with the cavity for

21   temperature locking said cavity, the reflectors, the active

22   material, and the nonlinear crystal, the thermostating means

23   including a mechanical structure associated with the cavity.

1   2.   (previously presented) The apparatus claimed in
2   claim 1 wherein said cavity and the optical elements it comprises
3   are provided to minimize optical losses.

1   3.   (previously presented) The apparatus claimed in claim
2   1 wherein optical losses at said fundamental wavelength are less
3   than 2%.

1   4.   (previously presented) The apparatus claimed in
2   claim 1 wherein optical losses at said fundamental wavelength due
3   to thermal aberration are less than 1%.

1   5.   (previously presented) The apparatus claimed in
2   claim 1 wherein the active material is a crystal of $Nd:GdVO_4$.

1   6.   (previously presented) The apparatus claimed in
2   claim 1 wherein the active material is a crystal of Nd:YLF.

1   7.   (previously presented) The apparatus claimed in
2   claim 1 wherein the active material is a crystal of $Nd:YVO_4$.

1   8.   (previously presented) The apparatus claimed in
2   claim 5 wherein the nonlinear crystal is LBO.

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9.   (previously presented) The apparatus claimed in claim 5 wherein the nonlinear crystal is YCOB or GdCOB.

10.   (previously presented) The apparatus claimed in claim 1 wherein said visible beam is at the limit of diffraction or $TEM_{0,0}$.

11.   (previously presented) The apparatus claimed in claim 1 wherein the pumping beam is absorbed in two successive passes through the active material.

12.   (canceled)

13.   (currently amended) The apparatus claimed in claim 1 [[2]] wherein said mechanical structure comprise a structural base and elements for supporting the optics .

14.   (currently amended) The apparatus claimed in claim 1$\underline{3}$ [[2]] wherein said structural base and elements supporting the optics are made of copper or other heat conducting material and are in thermal contact with each other.

1   15. (currently amended) The apparatus claimed in claim
2   1<u>3</u> [[2]] wherein the temperature of the structural base is
3   regulated by means of an active system.

1   16. (currently amended) The apparatus claimed in claim 1
2   [[2]] wherein said mechanical structure has the shape of a
3   container [[,]] containing said cavity in sealed way.

1   17. (previously presented) The apparatus claimed in
2   claim 1 wherein said thermostating means comprise an additional
3   autonomous heat-regulating device to stabilize the temperature of
4   the nonlinear crystal in autonomous and more precise way than the
5   other elements of the cavity.

1   18. (previously presented) The apparatus claimed in
2   claim 1 wherein the reflectors are at least in part formed by
3   reflecting depositions on the laser crystal or on the nonlinear
4   crystal.

5   19. (previously presented) A method for generating a
6   visible laser beam in a laser cavity of the type whereby a
7   nonlinear crystal is inserted into said laser cavity to obtain said
8   visible laser beam through a second harmonic generation operation,
9   the method comprising the steps of:
10   selecting a nonlinear crystal cut for critical type I
11   phase matching;
12   aligning said nonlinear crystal at a temperature
13   predetermined by a thermostating means associated with said cavity
14   obtaining the phase matching condition;
15   optimizing the conversion into second harmonic with
16   additional small temperature adjustments around the predetermined
17   value.

1   20. (previously presented) The method claimed in claim
2   19 wherein the temperature regulation operation occurs in negative
3   feedback, detecting an actual-value signal of a sensor positioned
4   in proximity to the nonlinear crystal.

1   21. (previously presented) The method claimed in claim
2 19, further comprising the steps of:
3   reducing walk-off of the fundamental laser beam operating
4 on the dimension of the cavity mode inside the nonlinear crystal,
5 in order to contain a walk-off angle inside the divergence of the
6 beam;
7   selecting the length of the nonlinear crystal as a
8 function of the desired focusing.

1   22. (previously presented) The apparatus according to
2 claim 1 wherein the active material is arranged to keep the
3 aberration losses at less than 2%.